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Chonan

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(54) **WATERTIGHT CONNECTOR**

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
H01R 13/52 (2006.01)

(52) **U.S. Cl.**
CPC ***H01R 13/5221*** (2013.01); ***H01R 13/5202*** (2013.01); ***H01R 13/5205*** (2013.01)

(58) **Field of Classification Search**
CPC H01R 13/5205
See application file for complete search history.

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(57) **ABSTRACT**

A watertight connector has a one-piece rubber plug (**50**) on a rear part of a housing (**70**), and a rear holder (**30**) to be locked to the housing (**70**) is behind the rubber plug (**50**). A receptacle **10** is fit externally to the housing (**70**) from the front and closely contacts lips (**55**) of the rubber plug (**50**). The receptacle (**10**) includes short side walls (**15**) facing each other in a first direction and long side walls (**14**) facing each other in a second direction. The rear holder (**30**) includes short surfaces (**38**) at inner sides of the short side walls (**15**) and long surfaces (**37**) at inner sides of the long side walls (**14**). Holder-side escaping portions (**43**) retracted more backward than front ends of the long surfaces (**37**) are provided on front ends of the short surfaces (**38**) of the rear holder (**30**).

3 Claims, 8 Drawing Sheets

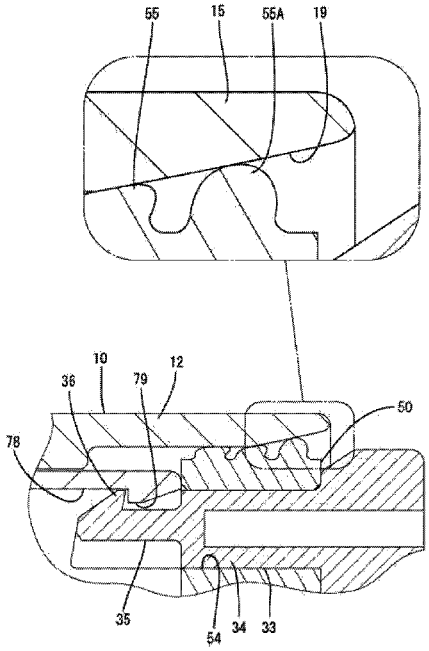

FIG. 1

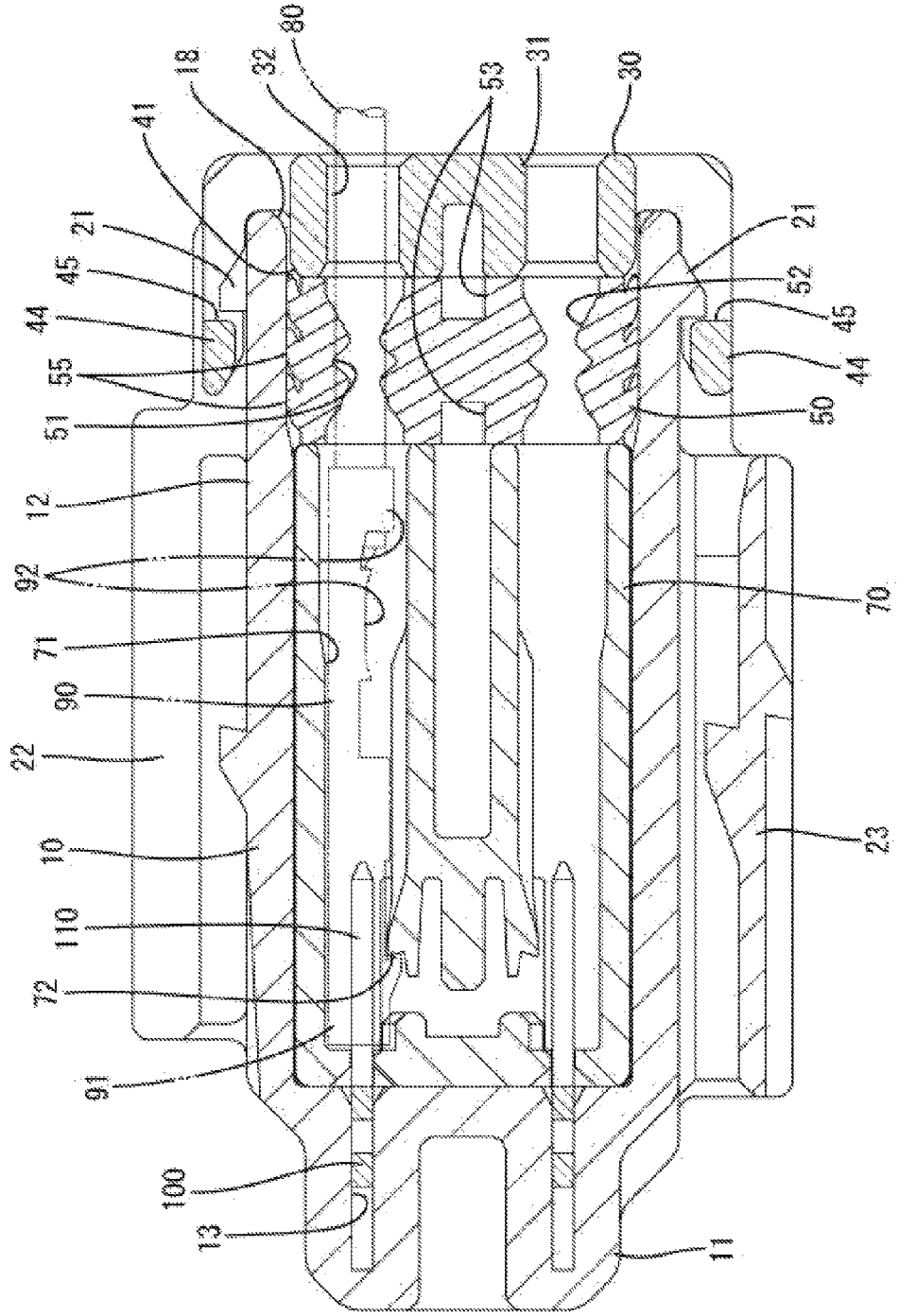
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FIG. 2

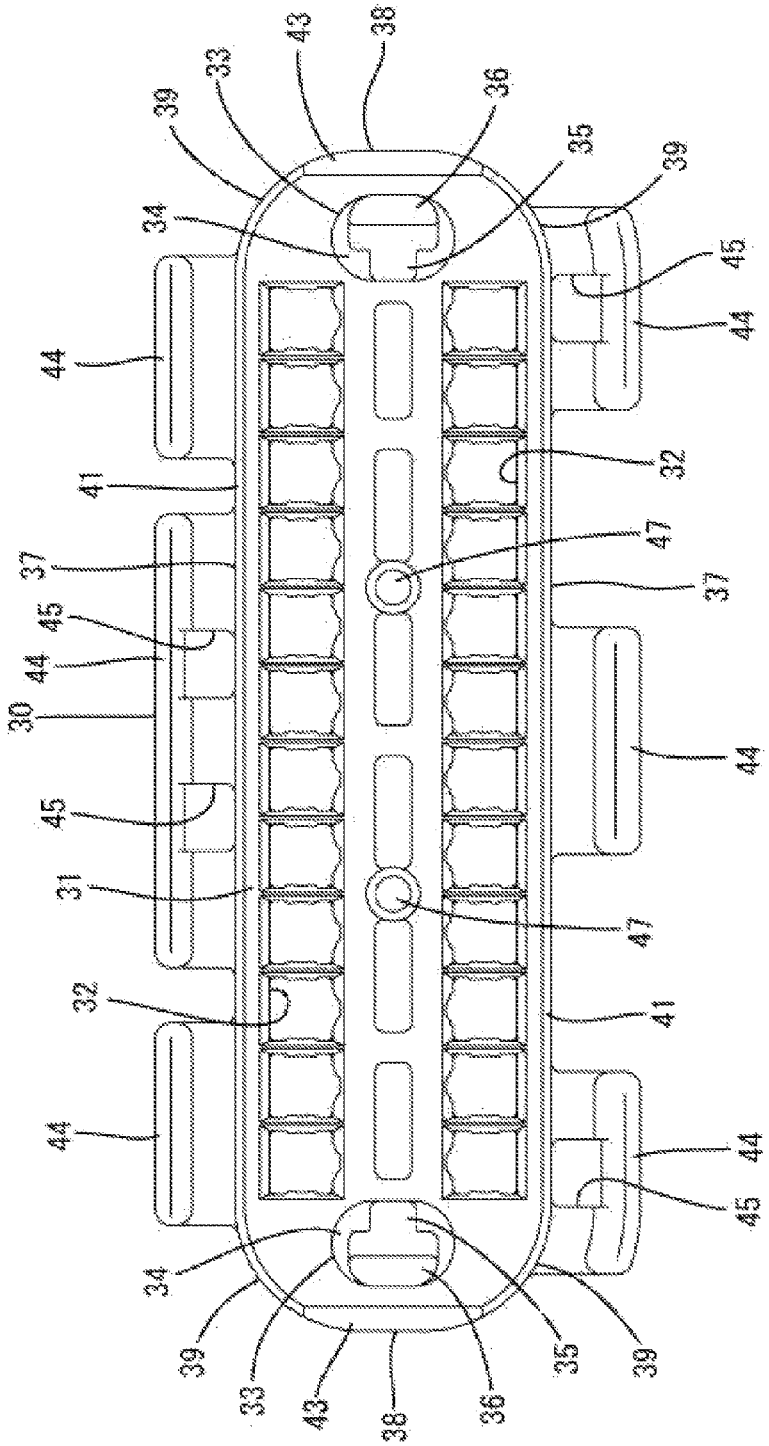
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FIG. 3

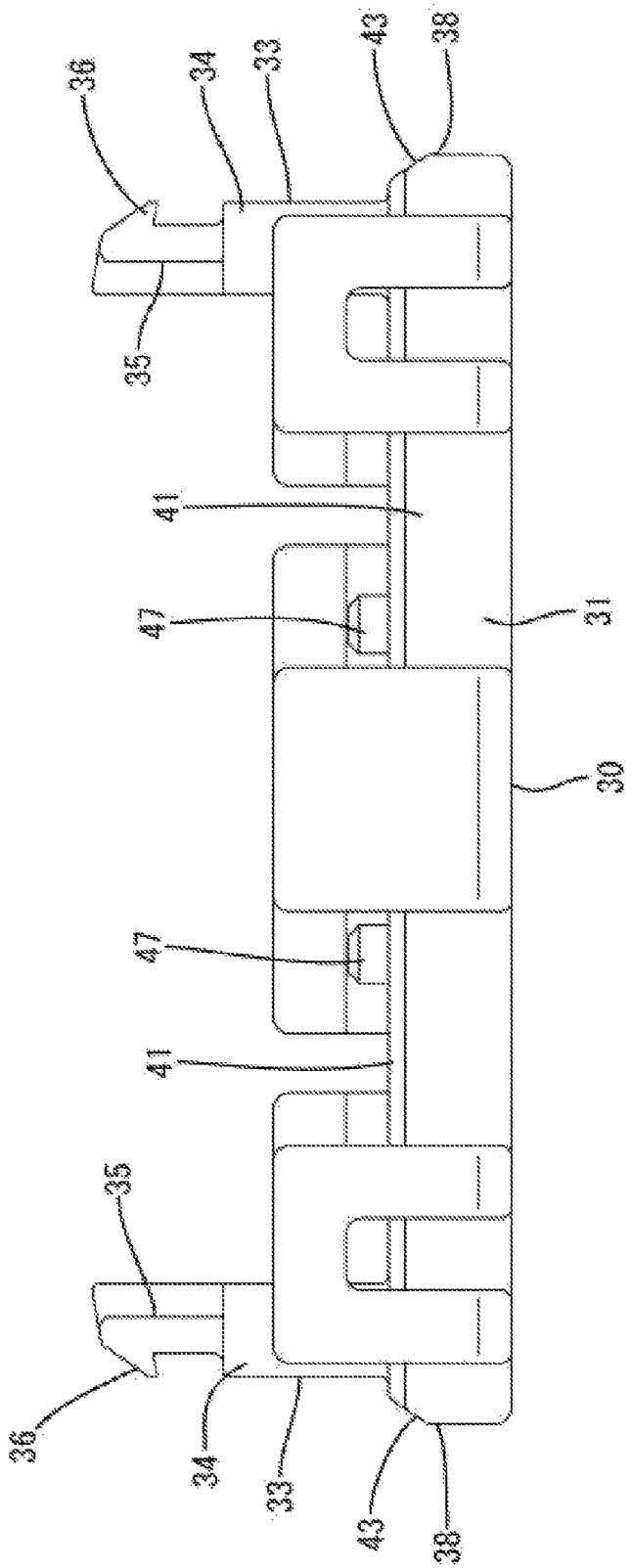

FIG. 4

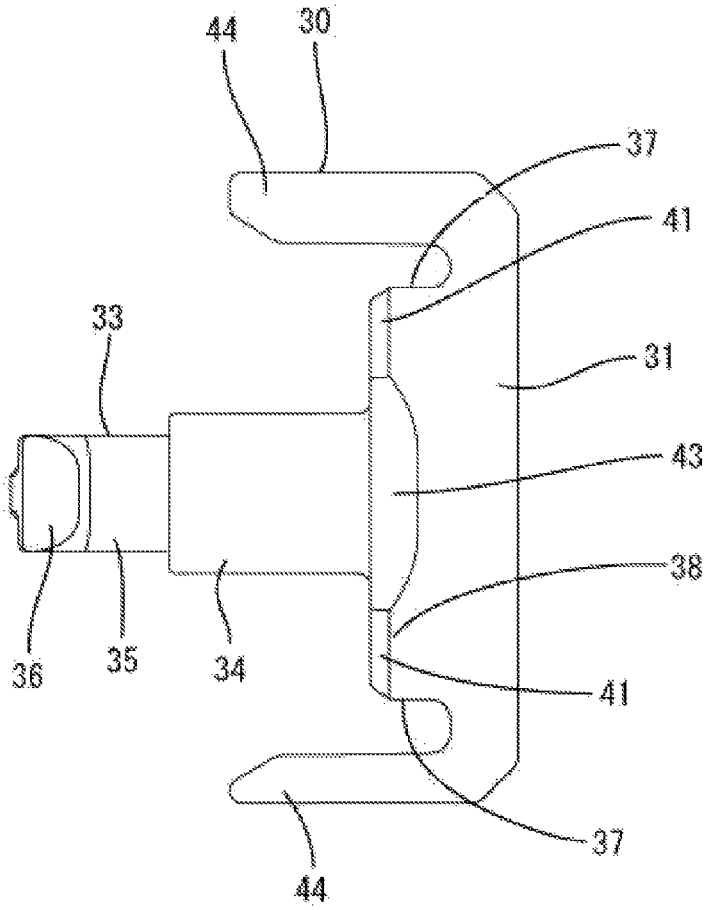

FIG. 5

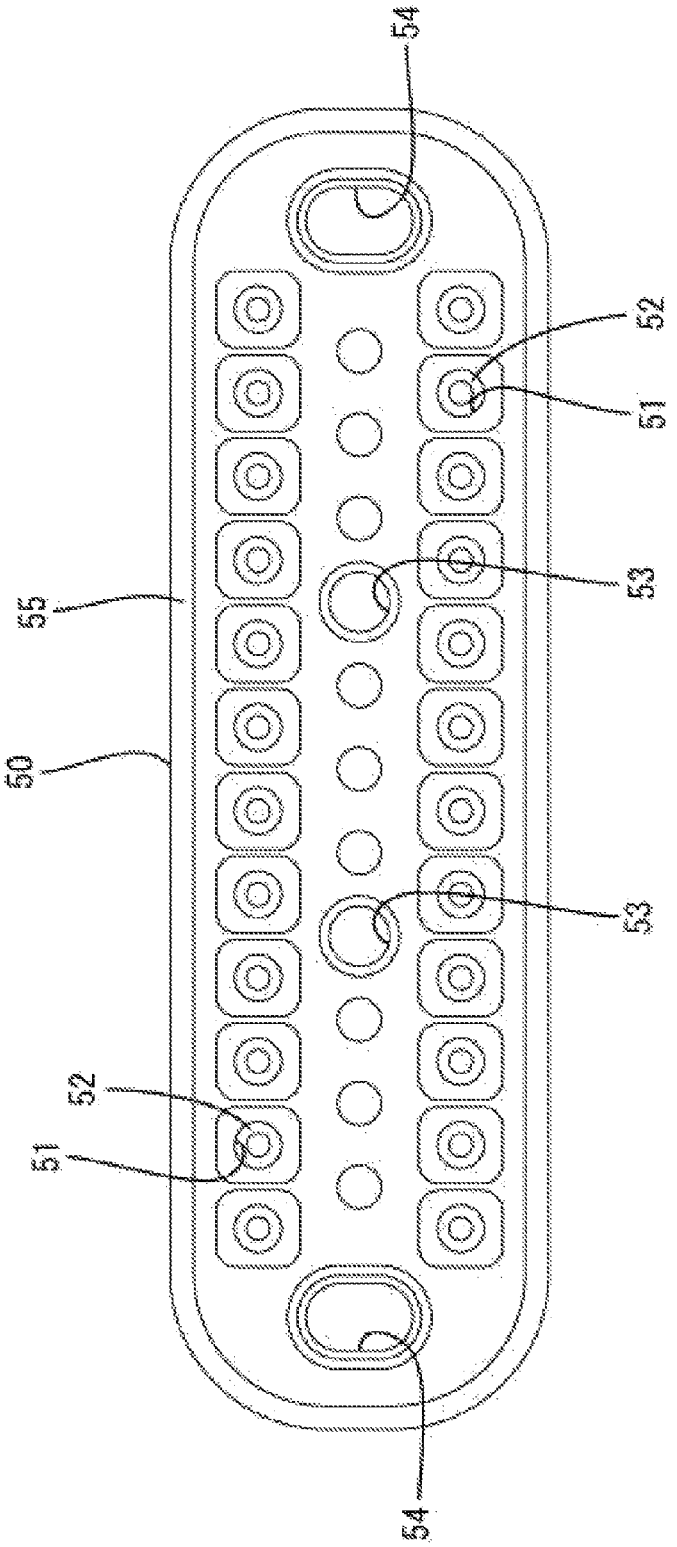

FIG. 6

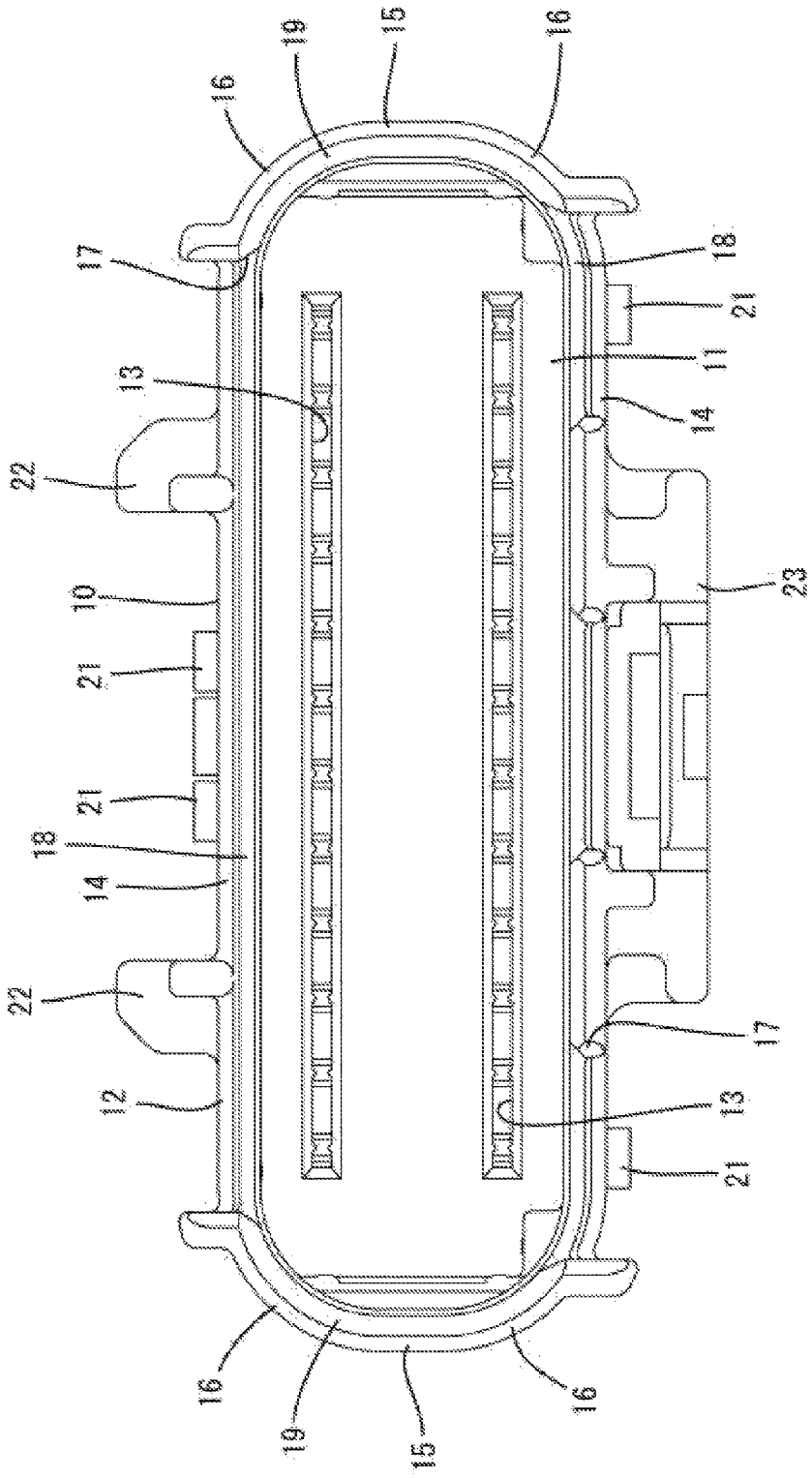
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FIG. 7

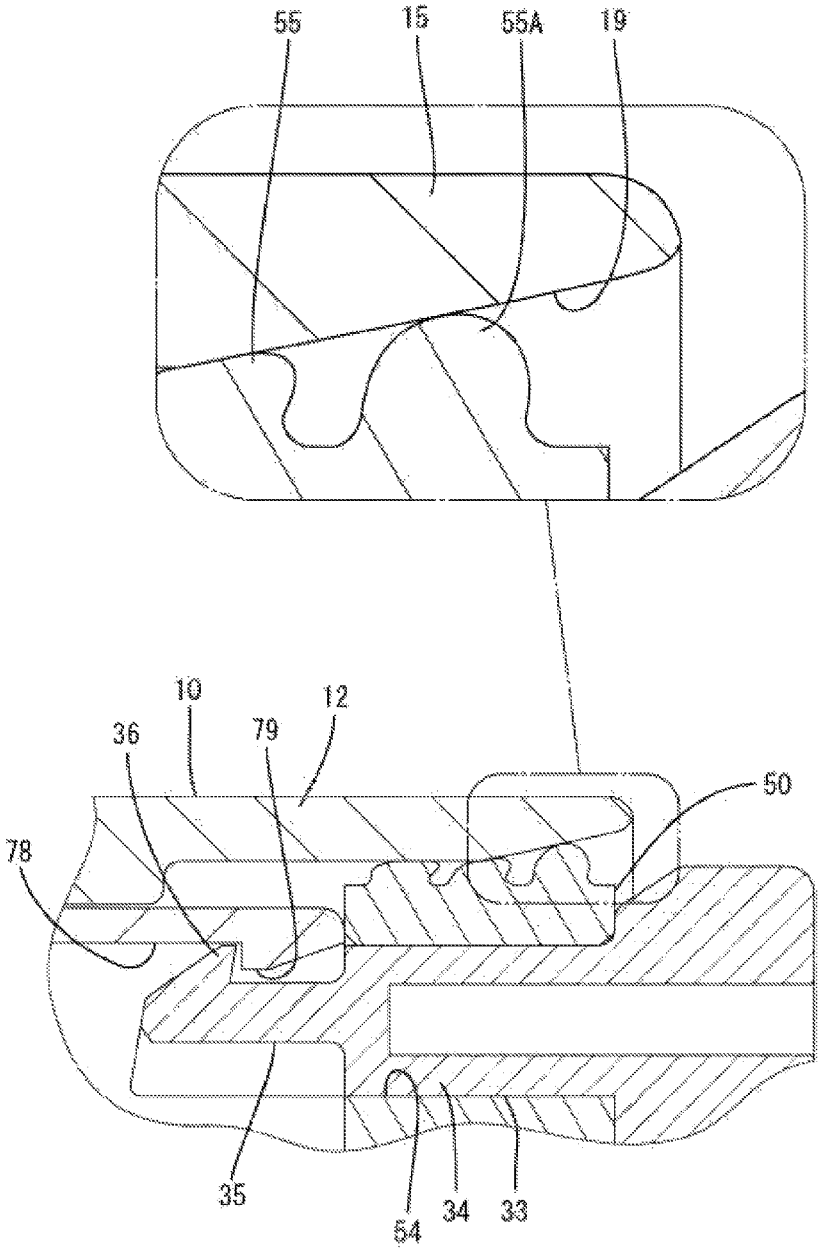
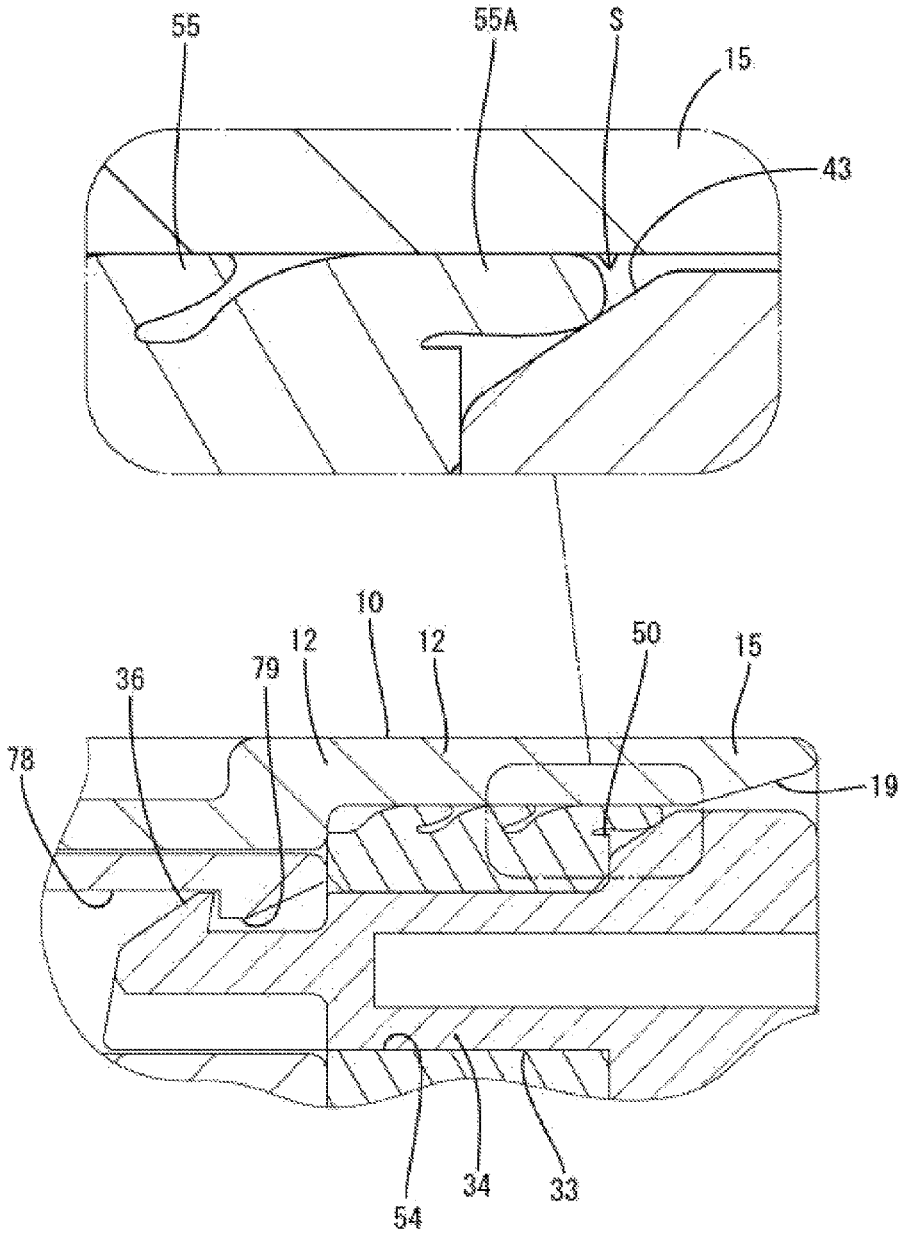


FIG. 8



WATERTIGHT CONNECTOR

BACKGROUND

1. Field of the Invention

The invention relates to a watertight connector.

2. Related Art

Japanese Unexamined Patent Publication No. 2006-127992 discloses a watertight connector with a housing for accommodating terminal fittings, a one-piece rubber plug arranged on a rear end part of the housing and seal holes through which wires connected to the terminal fittings are to be inserted in a liquid-tight manner. A rubber plug holder is arranged behind the one-piece rubber plug for sandwiching the one-piece rubber plug between the housing and the rubber plug holder by being locked to the housing, and a receptacle-like cap is fit externally to the housing from the front. A busbar body is mounted into a front end part of the housing and is formed by integrating a busbar with a holding body. The terminal fittings are connected to the busbar and short-circuited in a predetermined pattern when the busbar body is mounted into the housing. The cap is fit to the housing after the busbar body is mounted and an opening end part of the cap is held in close contact with a lip formed on the outer periphery of the one-piece rubber plug to prevent intrusion of water into the cap through a clearance between the inner periphery of the cap and the outer periphery of the one-piece rubber plug. The cap has a wide flat opening shape defined by arcuate short side walls that face each other in a lateral direction and straight long side walls facing each other in the vertical direction.

In the process of mounting the cap on the housing, the opening end part of the cap moves onto lips of the one-piece rubber plug and slides. Thus, the lips may be dragged by the cap to tilt. If the last lip largely tilts, this lip may be caught between the rubber plug holder and the cap and it may not be possible to ensure sealing. More particularly, if wires having a large outer diameter are inserted into the seal holes and the one-piece rubber plug bulges out, a large resilient reaction force is applied to the opening end part of the cap from the lip side of the one-piece rubber plug. Although the long side walls can suppress a contact pressure with the lip side by being deflected and deformed, the short side walls are difficult to deflect and deform and, hence, it is difficult to make a contact pressure with the lip side smaller. Thus, the lips tilt more on the short side walls than on the long side walls and the one-piece rubber plug is caught easily.

The invention was completed based on the above situation and aims to provide a watertight connector capable of ensuring sealability by avoiding the catching of a one-piece rubber plug.

SUMMARY

The invention is directed to a watertight connector with a housing into which terminal fittings are to be inserted. A one-piece rubber plug is arranged on a rear end part of the housing. The rubber plug includes seal holes through which wires connected to the terminal fittings are to be inserted in a liquid-tight manner and a lip on an outer periphery. A rear holder is arranged behind the one-piece rubber plug and is configured to sandwich the one-piece rubber plug between the housing and the rear holder by being locked to the housing. The watertight connector further has a receptacle to be fit externally to the housing from the front. The receptacle has an opening end part to be held in close contact with the lip of the one-piece rubber plug. The receptacle includes short side walls facing each other and extending in a first direction and long side walls facing each other and extending in a second direction intersecting the first direction. The rear holder includes short surfaces arranged at inner sides of opening end parts of the short side walls and long surfaces arranged at inner sides of opening end parts of the long side walls. Additionally, holder-side escaping portions are provided on front ends of the short surfaces of the rear holder and are retracted more backward than front ends of the long surfaces.

When the lip of the one-piece rubber plug contacts the opening end part of the receptacle, the long side walls of the receptacle are deflected and deformed to reduce a contact pressure with the lip. Thus, the tilt of the lip can be suppressed to be small and predetermined sealing can be ensured. On the other hand, the short side walls of the receptacle are difficult to deflect and deform, and the lip on the short side walls may be dragged by the receptacle to tilt back. However, the lip can tilt toward the holder-side escaping portions of the rear holder and will not be caught between the rear holder and the receptacle.

The receptacle-side escaping portions may be tapered and inclined back. According to this configuration, the lip can be inclined along the holder-side escaping portions and the damage of the lip can be prevented more reliably.

The rear holder may include lock pieces projecting forward through through holes of the one-piece rubber plug and having tips to be locked to the housing. The lock pieces are arranged at positions closer to the short surfaces than to the long surfaces. The lock pieces penetrate through the through holes of the one-piece rubber plug so that the one-piece rubber plug bulges out to increase a contact pressure between the receptacle and the lip. Thus, the lip on the short side walls easily tilts. Therefore, a merit of providing the holder-side escaping portions at positions corresponding to the short side walls and allowing the lip to escape toward the holder-side escaping portions increases.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a section of a watertight connector according to an embodiment of the invention.

FIG. **2** is a front view of a rear holder.

FIG. **3** is a bottom view of the rear holder.

FIG. **4** is a side view of the rear holder.

FIG. **5** is a front view of a one-piece rubber plug.

FIG. **6** is a rear view of a receptacle.

FIG. **7** is an enlarged view of an essential part while the receptacle is being externally fitted to a housing.

FIG. **8** is an enlarged view of an essential part in a state where the receptacle is externally fitted to the housing.

DETAILED DESCRIPTION

A watertight connector according to an embodiment of the invention is illustrated, as shown in FIGS. **1** to **8**. As shown in FIG. **1**, the watertight connector includes terminal fittings **90** made of electrically conductive metal, a housing **70** made of synthetic resin and capable of accommodating each terminal fitting **90**, a one-piece rubber plug **50** made of rubber and arranged on a rear end part of the housing **70**, a rear holder **30** made of synthetic resin and arranged behind the one-piece rubber plug **50** to be locked to the housing **70**, busbars **100** made of electrically conductive metal and a receptacle **10** made of synthetic resin and to be fit externally to the housing **70** with each busbar **100** mounted therein. When the receptacle **10** is fit externally to the housing **70**, the

respective terminal fittings **90** are short-circuited to the corresponding busbars **100** in a predetermined short circuit pattern. Note that left and right sides of FIG. **1** are referred to as front and rear ends concerning a front-back direction.

The terminal fitting **90** is long and narrow in the front-back direction and includes a tubular connecting portion **91** and an open barrel **92** arranged behind the connecting portion **91**. The barrel **92** is connected electrically and mechanically to an end part of a wire **80**. A later-described tab **110** of the busbar **100** is inserted into the connecting portion **91** to be electrically connected.

The housing **70** is in the form of a flat block short in a vertical direction (first direction) and wide in a lateral direction (second direction) when viewed from the front and internally includes a plurality of cavities **71** into which the terminal fittings **90** are insertable. The cavities **71** are arranged in upper and lower stages and forwardly projecting locking lances **72** are provided on a partition wall between the upper and lower cavities **71**. The locking lances **72** lock the connecting portions **91** to hold the terminal fittings **90** in the cavities **71**.

As shown in FIG. **5**, the one-piece rubber plug **50** is flat mat wide in the lateral direction to correspond to the housing **70** and internally includes seal holes **51** through which the wires **80** connected to the terminal fittings **90** are insertable. The seal holes **51** are circular openings and are arranged in upper and lower stages to correspond to the respective cavities **71**. Inner peripheral lips **52** are provided circumferentially on the inner periphery of the seal hole **51** and can closely contact the outer peripheral surface of the wire **80**.

Bottomed positioning holes **53** are provided side by side in the lateral direction between the upper and lower seal holes **51** on the front and rear surfaces of the one-piece rubber plug **50**. Positioning pins **47** on the housing **70** and the rear holder **30** are fit into the respective positioning holes **53** to position the one-piece rubber plug **50** with respect to the housing **70** and the rear holder **30**. Through holes **54** are provided on opposite left and right end parts of the one-piece rubber plug **50** across an area where the seal holes **51** are arranged. The through holes **54** have an elliptical opening slightly longer in the vertical direction.

Lips **55** are provided one after another on the outer periphery of the one-piece rubber plug **50**. Each lip **50** is provided over the entire circumference of the one-piece rubber plug **50** while having a constant projecting dimension. When the receptacle **10** is fit externally to the housing **70**, each lip **55** is held in close contact with an open rear end part of the receptacle **10** and a clearance between the receptacle **10** and the one-piece rubber plug **50** is sealed in a liquid-tight manner.

As shown in FIG. **2**, the rear holder **30** includes a holder main body **31** defining a flat plate short in the vertical direction and long in the lateral direction when viewed from the front and corresponding to the housing **70**. Wire insertion holes **32** penetrate through the holder main body **31** in the front-back direction through and the wires **80** can be inserted loosely therethrough after insertion of the terminal fittings **90**. The wire insertion holes **32** have substantially rectangular cross-sectional shapes corresponding to that of the connecting portions **91** of the terminal fittings **90** and are arranged in upper and lower stages to correspond to the respective cavities **71** and the seal holes **51**.

The positioning pins **47** project side by side in the lateral direction on the front surface of the holder main body **31** and are insertable into the positioning holes **53** on the rear surface of the one-piece rubber plug **50**. Lock pieces **33** project forward on opposite left and right ends of the front surface of the holder main body **31** across an area where the respective wire insertion holes **32** are arranged. As shown in FIG. **3**, each lock piece **33** has a column-like base **34** and a lock main body **35** projecting forward from the tip of the base **34**. The base **34** has an elliptical cross-sectional shape corresponding to the through hole **54** of the one-piece rubber plug **50**. The lock main body **35** is slightly smaller than the base **34**. The base **34** is held in close contact with the inner periphery of the through hole **54** and penetrates through the one-piece rubber plug **50** in a liquid-tight manner. The lock main body **35** is deflectable and deformable with a coupled part to the base **34** as a support. A claw-like locking projection **36** projects out on a tip part of the lock main body **35**. As shown in FIG. **7**, the lock main body **35** is inserted into a locking hole **78** open on the rear surface of the housing **70** and the locking projection **36** is locked resiliently to a lock receiving portion **79** formed on the inner surface of the locking hole **78** to retain the rear holder **30** on the housing **70**.

As shown in FIG. **2**, both vertical end parts of the holder main body **31** include long surfaces **37** extending straight in the lateral direction when viewed from the front and both left and right ends of the holder main body **31** include short surfaces **38** extending straight in the vertical direction when viewed from the front. The holder main body **31** has four corner surfaces **39** connecting both left and right ends of the long surfaces **37** and both upper and lower ends of the short surfaces **38**. The corner surfaces **39** are arcuate when viewed from front. A holder-side chamfer **41** is provided on the front end edge of each of the long surfaces **37** and the corner surfaces **39**. As shown in FIG. **1**, the holder-side chamfer **41** is tapered at a fixed angle toward the front.

A holder-side escaping portion **43** in the form of a cut is provided on the front end edge of the short surface **38** of the holder main body **31**. As shown in FIG. **8**, the holder-side escaping portion **43** is tapered at a fixed angle toward the front. As shown in FIG. **3**, angles of inclination of the holder-side escaping portions **43** and the holder-side chamfered portions **41** to the front-back direction are substantially equal. The holder-side escaping portions **43** have a longer length in the front-back direction than the holder-side chamfers **41**, and the rear end edges of the holder-side escaping portions **43** are located behind those of the holder-side chamfers **41**. Upper and lower ends of the holder-side escaping portion **43** are included in the corner surfaces **39** and arranged to be connected to the holder-side chamfered portions **41**.

As shown in FIG. **2**, the front end edge of the holder-side escaping portion **43** extends straight in the vertical direction on the front surface of the holder main body **31**. Further, as shown in FIG. **4**, a vertical central part of the rear end edge of the holder-side escaping portion **43** extends straight in the vertical direction and both upper and lower end parts thereof arcuately extend from the vertical central part toward the holder-side chamfered portions **41**.

Holding pieces **44** project side by side in the lateral direction on the upper and lower long surfaces **37** of the holder main body **31**. Each holding piece **44** is arranged above the holder-side chamfer **41** and is in the form of a plate projecting forward after standing up. The holding pieces **44** located on both left and right sides of the lower long surface **37** and the one located on a lateral center of the upper long surface **37** have vertically penetrating holding holes **45**, as shown in FIG. **1**.

The receptacle **10** is a wide flat tube conforming to the shape of the housing **70**. As shown in FIGS. **1** and **6**, the receptacle **10** has a back wall **11** and a peripheral wall **12**

projecting from the outer periphery of the back wall **11**. Press-fit holes **13** are provided in upper and lower stages on the back wall **11** and the busbars **100** are press-fit therein. The busbars **100** include the tabs **110** that project into the receptacle **10** and connect to the corresponding terminal fitting **90**.

As shown in FIG. **6**, the peripheral wall **12** includes long upper and lower walls **14** extending straight in the lateral direction when viewed from behind and left and right short side walls **15** extending vertically. Arcuate corner walls **16** connect left and right ends of the long upper and lower walls **14** to upper and lower ends of the short left and right side walls **15**. Cuts **17** are provided on the rear end edges of the long upper and lower walls **14** and are recessed forward from the rear end edges of the left and right short side walls **15** and the corner walls **16**. Standing-up parts of the holding pieces **44** are inserted into the cut portions **17** when the receptacle **10** is fit externally to the housing **70**.

A receptacle-side chamfered portion **18** in the form of a cut is provided on the inner surface of a rear end part of the long side wall **14**. The receptacle-side chamfers **18** has a tapered shape opening at a fixed angle toward the back. Further, a receptacle-side escaping portion **19** in the form of a cut is provided on the inner surfaces of rear end parts of the short side walls **15** and the corner walls **16**. The receptacle-side escaping portion **19** has a tapered shape opening at a fixed angle toward the back. An angle of inclination of the receptacle-side escaping portions **19** to the front-back direction is smaller than that of the receptacle-side chamfers **18** to the front-back direction. The receptacle-side escaping portions **19** have a longer length in the front-back direction than the receptacle-side chamfers **18**. The rear end edges of the receptacle-side escaping portions **19** are located behind those of the receptacle-side chamfers **18** (except the receptacle-side chamfers **18** on the side of the cut portions **17**).

Claw-like holding projections **21** are provided at positions behind the receptacle-side chamfers **18** on the outer surfaces of the upper and lower long walls **14**. As shown in FIG. **1**, the receptacle **10** is fit externally on the housing **70** and the holding projections **21** are inserted resiliently into the holding holes **45** of the holding pieces **44** so that the receptacle **10** is held on the housing **70** via the rear holder **30**. As shown in FIG. **6**, two holding projections **21** are arranged in each of a lateral central part of the upper long wall **14** and on both left and right sides of the lower long wall **14**. Rail-like guides **22** are provided at opposite left and right sides across the holding projections **21** on the outer surface of the upper long wall **14** and extend in the front-back direction. Further, a flat box-shaped mounting portion **23** is provided between the left and right holding projections **21** on the outer surface of the lower wall **14**. The guides **22** and the mounting portion **23** are mounted by being engaged with an unillustrated bracket mounting structure.

The connector is assembled by initially mounting the one-piece rubber plug **50** on the housing **70** from behind. At this time, the one-piece rubber plug **50** is positioned with respect to the housing **70** by inserting unillustrated positioning pins of the housing **70** into the positioning holes **53** of the one-piece rubber plug **50**. As a result, the seal holes **51** of the one-piece rubber plug **50** communicate with the respective cavities **71** of the housing **70**.

The rear holder **30** then is mounted to the housing **70** from behind to cover the rear surface of the one-piece rubber plug **50**. The lock main bodies **35** of the lock pieces **33** are inserted into the locking holes **78** of the housing **70** through the through holes **54** of the one-piece rubber plug **50** and the locking projections **36** of the lock main bodies **35** are locked to the lock receiving portions **79** to hold the rear holder **30** on the housing **70**. At this time, the front surface of the holder main body **31** is in close contact with the rear surface of the one-piece rubber plug **50**. Additionally, the positioning pins **47** of the rear holder **30** are inserted into the positioning holes **53** of the one-piece rubber plug **50**. Thus, the one-piece rubber plug **50** is positioned with respect to the rear holder **30** and is sandwiched and held between the rear holder **30** and the housing **70**. Further, the seal holes **51** of the one-piece rubber plug **50** communicate with the respective wire insertion holes **32** of the rear holder **30**. Furthermore, the base ends **34** of the lock pieces **33** are inserted into the through holes **54** and the left and right ends of the one-piece rubber plug **50** are pressed against the base ends **34** and deform to bulge outward. In this way, the interior of the connector is held in a liquid-tight manner.

Subsequently, the terminal fittings **90** are inserted into the cavities **71** of the housing **70**. The terminal fitting **90** is inserted into the cavity **71** from the wire insertion hole **32** by way of the seal hole **51**. When the terminal fitting **90** is inserted into the cavity **71**, the outer peripheral surface of the wire **80** is held resiliently in close contact with the inner peripheral lips **52** of the seal hole **51** and the one-piece rubber plug **50** is deformed to bulge slightly outward.

Subsequently, the receptacle **10** then is fit externally to the housing **70** from the front. In the process of externally fitting the receptacle **10**, the inner surface of the rear end of the receptacle **10** slides on the lips **55** of the one-piece rubber plug **50** and the lips **55** are dragged by the receptacle **10** to tilt backward. At this time, on the long sides, the lips **55** slide on the receptacle-side chamfers **18** of the long side walls **14** and the long side walls **14** can resiliently bulge out utilizing their lateral lengths. Thus, sliding resistance between the lips **55** and the long side walls **14** is reduced and the tilt (inclination) of the lips **55** is also suppressed to be small. Further, on the short sides, the lips **55** slide on the receptacle-side escaping portions **19** of the short side walls **15**, as shown in FIG. **7**, but the receptacle-side escaping portions **19** are retracted out in directions away from the lips **55**. Thus, as on the long sides, sliding resistance between the lips **55** and the short side walls **15** is reduced and the tilt of the lips **55** also is suppressed to be small. Therefore, the lips **55** do not tilt back large amounts in the process of externally fitting the receptacle **10**.

When the receptacle **10** is fit externally to the housing **70**, the receptacle-side escaping portions **19** and the receptacle-side chamfers **18** pass over the one-piece rubber plug **50** to be separated therefrom, the long surface portions **37** of the rear holder **30** are arranged to face the inner sides of the rear parts of the long side walls **14** and the short surfaces **38** of the rear holder **30** are arranged to face the inner sides of the rear parts of the short side walls **15**. In this state, the respective holding projections **21** of the receptacle **10** are inserted and locked to the holding holes **45** of the respective holding pieces **44** of the rear holder **30** and the receptacle **10** is retained and held on the housing **70** via the rear holder **30**.

As described above, the backward tilt of the lips **55** is suppressed by the deflection of the long side walls **14** and escaping structures of the receptacle-side escaping portions **19**. Nevertheless, the lips **55** are dragged by the rear end part of the receptacle **10** to tilt back. However, the holder-side escaping portions **43** of the rear holder **30** are retracted behind the lips **55** on the short sides that tend to tilt large amounts and the holder-side chamfers **41** also are located

behind the lips **55** on the long sides that are expected to tilt to a relatively small degree. Thus, the tilt of the lips **55** is permitted.

Specifically, as shown in FIG. **8**, the last lip **55**A is accommodated in a tilted state in a space S between the holder-side escaping portion **43** (also holder-side chamfer **41**) of the rear holder **30** and the inner surface of the receptacle **10**. Further, the last lip **55**A is in contact along the tapered inclined surface of the holder-side escaping portion **43** and can be held in close contact with the inner surface of the rear end part of the receptacle **10** with a predetermined resilient force by receiving a reaction force from the rear holder **30**. Thus, a clearance between the receptacle **10** and the one-piece rubber plug **50** is filled up with all the lips **55** including the last lip **55**A and the sealability of the one-piece rubber plug **50** is ensured.

On the other hand, the last lip **55**A is not pushed back strongly by the rear holder **30** due to the holder-side escaping portions **43** and the escaping structures of the holder-side chamfers **41**. Thus, the last lip **55**A is not likely to be caught between the inner surface of the receptacle **10** and the rear holder **30** and the damage of the lips **55** can be prevented.

As described above, the tilt of the lips **55** can be suppressed to be small in the process of externally fitting the receptacle **10** to the housing **70** since the receptacle-side escaping portions **19** are retracted in the directions to reduce the contact with the lips **55** on the short sides. Further, the tilt of the lips **55** on the long sides can be suppressed to be small by the deflection of the long side walls **14**. Thus, the tilt of the lips **55** can be suppressed to be small on both short and long sides.

Further, when the receptacle **10** is fit externally to the housing **70**, the tilt of the lips **55** is permitted by the holder-side escaping portions **43** and the holder-side chamfers **41** and the tilted lips **55** are not pushed back strongly by the rear holder **30**. Thus, the lips **55** will not be caught between the receptacle **10** and the rear holder **30**. As a result, the lips **55** will not be damaged and the satisfactory sealing of the one-piece rubber plug **50** is ensured.

Further, since the receptacle-side chamfers **18** need not have a large retracted shape unlike the receptacle-side escaping portions **19**, the receptacle **10** need not be enlarged. Further, the holder-side escaping portions **43** are tapered and inclined back and the lips **55** can be inclined along the holder-side escaping portions **43**. Thus, damage of the lips **55** can be prevented more reliably.

Furthermore, since the lock pieces **33** are arranged at the positions closer to the short surfaces **38** than to the long surfaces **37**, a contact pressure between the receptacle **10** and the lips **55** may increase and the lips **55** on the short sides may easily tilt when the lock pieces **33** penetrate through the through holes **54** of the one-piece rubber plug **50** and the one-piece rubber plug **50** bulges out. However, the holder-side escaping portions **43** are provided on the short sides so that the lips **55** can escape toward the holder-side escaping portions **43**.

Furthermore, the receptacle-side escaping portions **19** are arranged at positions distant from the lips **55** and parts of the rear end part of the receptacle **10** other than the receptacle-side escaping portions **19** are held in close contact with the lips **55** with the receptacle **10** externally fit to the housing **70**. Thus, predetermined sealing can be reliably ensured by increasing a close contact force between the receptacle **10** and the lips **55**.

Other embodiments are briefly described below.

Although the busbars are mounted in the receptacle in the above embodiment, male terminal fittings may be accommodated in the receptacle and further connected to end parts of wires in the present invention.

The receptacle may be a mere cap (see, for example, Japanese Unexamined Patent Publication No. 2006-127992) holding no busbars.

In the present invention, contrary to the above embodiment, the short side walls and the short surface portions may be arranged along the lateral direction and the long side walls and the long surface portions may be arranged along the vertical direction. In short, when a short side direction of the short side walls and the short surfaces is a first direction, a long side direction of the long side walls and the long surface portions has only to be a second direction intersecting with the first direction.

Although the short side walls and the short surface portions extend straight when viewed from front in the above embodiment, the short side walls and the short surface portions may be arcuately curved when viewed from front in the present invention.

The rear end part of the housing may be structured to include an accommodation recess for accommodating the one-piece rubber plug.

The receptacle may be structured to be held on the housing by being locked to the housing.

The holder-side escaping portions may be provided in ranges including the short surface portions and the corner surface portions.

The receptacle-side escaping portions may be provided only on the short surface portions.

LIST OF REFERENCE SIGNS

10 . . . receptacle
14 . . . long side wall
15 . . . short side wall
19 . . . receptacle-side escaping portion
30 . . . rear holder
37 . . . long surface
38 . . . short surface
43 . . . holder-side escaping portion
50 . . . one-piece rubber plug
55 . . . lip
70 . . . housing
80 . . . wire
90 . . . terminal fitting

What is claimed is:

1. A watertight connector, comprising:

a housing into which terminal fittings are to be inserted;

a one-piece rubber plug arranged on a rear end part of the housing, including seal holes through which wires connected to the terminal fittings are to be inserted in a liquid-tight manner and including a lip on an outer periphery;

a rear holder arranged behind the one-piece rubber plug and configured to sandwich the one-piece rubber plug between the housing and the rear holder by being locked to the housing; and

a receptacle to be fit externally to a front of the housing and having an opening end part to be held in close contact with the lip of the one-piece rubber plug,

wherein:

the receptacle includes short side walls facing each other and extending in a first direction and long side walls facing each other and extending in a second direction intersecting the first direction;

the rear holder includes short surfaces arranged at inner sides of opening end parts of the short side walls and

long surfaces arranged at inner sides of opening end parts of the long side walls; and

holder-side escaping portions retracted more backward than front ends of the long surfaces are provided on front ends of the short surfaces of the rear holder.

2. The watertight connector of claim **1**, wherein receptacle-side escaping portions are provided on the short side walls of the receptacle and are tapered and inclined backward.

3. The watertight connector of claim **1**, wherein the rear holder includes lock pieces projecting forward through through holes of the one-piece rubber plug and having tip parts to be locked to the housing, and the lock pieces are arranged at positions closer to the short surfaces than to the long surfaces.

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